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A study of nursing patient care in gestational diabetes during SARS CoV-2 pandemic

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***Abstract*---**Although hyperglycaemia that occurs in pregnancy and resolves after birth has been recognised for over fifty years, worldwide consensus on levels of hyperglycaemic thresholds is incomplete and should be diagnosed as 'gestational diabetes mellitus' (GDM). The involvement of GDM is linked to a number of negative perinatal outcomes, including macrosomia, preterm delivery, pre-eclampsia, and eventually will affect the metabolic wellbeing of the resulting infant in future. A nursing care model for non-communicable disorders in primary hospitals increased therapy compliance, as providers aided by clear guidance and administration flowcharts. Early reports from China find COVID-19 infections among men in Wuhan. Later evidence from 30 jurisdictions outside Hubei demonstrated a drop in male domination, as did young women who were diagnosed with the disease at middle age. The psychological and mental health of mothers with GDM has become a big burden with this pandemic in the COVID-19 world-wide that resulted in serious deaths. However, as far as we know, no study explores the success of

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nurses or licensed clinical nurses during the SARS CoV-2 pandemic in caring for women with GDM. Therefore, the qualitative research was intended to examine and explain the perspectives and opinions of healthcare management after a woman was diagnosed with COVID-19 infection during GDM infection.

***Keywords*---**gestational diabetes mellitus, SARS CoV-2 pandemic, COVID-19 infection, nursing officer.

Introduction

Although hyperglycaemia that occurs in pregnancy and resolves after birth has been recognised for over fifty years, worldwide consensus on levels of hyperglycaemic thresholds is incomplete and should be diagnosed as 'gestational diabetes mellitus' (GDM). GDM is probably the most frequent medical condition for pregnancy. It develops because of alterations in physiology, endocrine and metabolic throughout the pregnancy to fulfil nutrients and oxygen needs in the fetus constantly. The diabetes disease, close to that of type 2, increases insulin resistance, decreases insulin sensitivity and, as a consequence, increases the need for insulin[1].

While the incidence of pregnant women with obesity in upper- and middle-income countries had risen over the last few decades, it decreased in the lower and middle classes because of reduced jobs in agriculture as a result of urbanization[2]. The GDM disease is one of the most prevalent pregnancy complications and estimates of 14% - 15.8% of the pregnancies, worldwide[1, 3, 4]. GDM affects about 1 in 20 pregnant women in the US[5-7], and the chance of developing GDM later in life in subsequent pregnancy and type 2 diabetes is increased[8-11]. Women of GDM and their descendants are at an elevated risk of both short-term and long-term complications including a heightened risk of lifelong obesity, diabetes Type 2 and metabolic syndrome for the mothers and their offspring. Furthermore, the most frequent metabolic complication in pregnancies, which is associated with maternal complexes such as high blood pressure and pre-eclampsia, caesareans, infections and polyhydramnios. Fetal morbidity is also associated with macrosomia, birth complications, hypoglycemia, hypocalcaemia, hyperbilirubinemia, asphyxia and polycythemia[12, 13].

Healthy quality of life in various clinical trials was widely acknowledged as a highly important outcomes[14]. Quality of life can function as a unifying concept in many fields including general, physical and psychological wellbeing, positive external interactions, environmental control, motivation for life, self-recognition, individuality and personal growth factors. GDM diagnosed women must consult with their medical provider to optimize maternal and fetal results. This team can include doctors, midwives, licensed diabetes instructors, registered nurses, and dieticians. Much further, nursing officer have an important role in the screening and management of a mother's life style (exercise, diet, and nutrition), and control of blood sugar levels, and the regular administration of diabetes medications should be strongly emphasized in order to protect both maternal and neonatal health[15]. However, in Wuhan, China early reports found that COVID-19

infections were prevalent in men, 68% of whom were infected[16, 17]. Later data from 30 jurisdictions outside Hubei showed that male predominance decreased, as did the middle age of the young women diagnosed by the disease[18]. With this pandemic in the COVID-19 worldwide, which resulted in major deaths, the psychological and mental wellbeing of maternal health with GDM has become a huge burden. In patients with extreme COVID-19, there is a high incidence of previously occurring comorbidities. 64.3 percent of patients in the Wuhan hospital have at least one comorbidity, with 12.1 percent of patients suffering from diabetes[19]. for example, in ten trials reports, including 76,993 patients and the prevalence of hypertension was 16.37% (95% confidence interval [CI] 10,15-23,65%), CVD 12.11% (95% CI 4,40%-22,75%), and the prevalence of diabetes 7.87% (95% CI 6,57–9,28%)[20]. Furthermore, cytokine storm due to SARS CoV-2 attack can induce considerable insulin resistance and therefore require a high dose of insulin. In addition to that directly diabetogenic effect of SARS- CoV-2 attack has been found in pancreatic islets, so the binding domain for virus like ACE2 needs to be assessed. However, as far as we know, no research tested the success of nurses or licensed clinical nurses during the SARS CoV-2 pandemic in caring for women with GDM. Therefore, the qualitative research was intended to examine and explain the perspectives and opinions of healthcare management after a woman was diagnosed with COVID-19 infection during GDM infection.

Selection of literature review

Articles were obtained through a literature search in PubMed, ScienceDirect, Embase, Springer, Cochrane library, Google Scholar, Proquest, Web of Science, Mendeley and Scopus and by manually filtering of reference lists of relevant articles. In addition to the literature analysis, several keywords were used. The main search terms are "Gestational diabetes", "Epidemiology of gestational diabetes, pathology in gestational diabetes", "Involvement of cytokines in COVID-19 infection", "SARS CoV2 mediated impact on gestation diabetic patient ", "Pathophysiology of gestational diabetes", "Approaches to treat COPD", "SARS CoV-2 mediated immunomodulatory reaction", "Nursing approaches for a patient with gestational diabetes". This article is intended for English publications. For publications not found on the original search, reference lists are also scoured.

Gestational diabetes mellitus pathology

Although, some time before, the occurrence of hyperglycaemia that occurs during pregnancy and resolves after childbirth was noticed and was usually found in the late 2nd Trimester (13-26 pregnancy weeks) or early 27-040 weeks)[21]. The involvement of GDM is linked to a number of negative perinatal outcomes, including macrosomia, preterm delivery, pre-eclampsia, and eventually will affect the metabolic wellbeing of the resulting infant in future[22, 23]. The main risk factors for GDM are overweight and obese of the mothers, later childbirth, prior history of GDM, family history of type 2 diabetes mellitus and race. Obesity is a prime factor for greater number in cases of cases of GDM, where caloric consumption exceeds demands[24]. The obese model seems to be linked to the continuous occurrence of high serum insulin levels, the higher existence of pro-inflammatory cytokines/adipokins, systemic inflammation and decreased

circulating adiponectin[25, 26]. During a pregnancy, metabolic adjustments placed more tension on β cells. The elevated risk of T2DM in women with GDM history in the years following pregnancy is both associated with pre-existing baseline anomalies and the addition of progressive cell dysfunctions after GDM pregnancy index that are linked to factors such as retention of unhealthy gestational weight gain and a rise in insulin resistance. Just a small number (2–13 percent) of women with GDM have antibodies to such β-cell antigens[27]. Whereas about 5% of women with GDM have monogenic diabetes mellitus types, which generally include GCK (glucokinase encoding) mutations in white populations[28]. Thus, GDM found to have lower (80%-85% compared to almost 100%) inhibition of endogenous glucose, leading to post-prandial hyperglycaemia in this group. In late pregnancy, level of insulin receptor substrate 1(IRS1) in one of the signalling molecules is negligible in skeletal muscle instead of non-pregnant women. In addition to the reduction in IRS1, in women with GDM autophosphorylation in IRβ is reduced to 25 percent smaller in the biopsy of the muscle in skeletals than for those who are pregnant with normal glucose tolerance. Besides the decreased levels of IRS1, the autophosphorylation of IRβ is less for women with GDM than women who have typical tolerances of glucose, which leads to a 25% lower intake of glucose in the biopsied muscle skeleton[29]. Another factor disrupting the cascade of insulin signaling are inflammation which is also attributed to obesity[30]. Tumor necrosis factor (TNF) stimulates a signaling pathway that raises sphingomyelinase level, ceramide levels that interact with autophosphorylation of the insulin receptor and supports IRS1 serine phosphorylation, interrupting the insulin signal cascade. TNF circulation is strongly adversely linked to insulin sensitivity during pregnancy[31].

Overview of SARS CoV-2 transmission and its pathogenesis

The 2019 COVID disease is a deadly disease which can lead to severe respiratory disease[16]. On 11 March 2020, the WHO, even though COVID-19 is quickly spreading across the world, announced the outbreak to be a global pandemic[32]. In our opinion, however, we now have ample proof of many pathological molecular pathways for the transfer of aerosolized droplet of viral SARS CoV-2 particles to the lungs. For most viruses, it is well known that receptor-medicated endocytosis is the typical mechanism for entering a host cell. In the wider sense, singh et al. explore that the receptor used to target and alter lung cells by COVID-19 virus will most likely be ACE2, a protein located on the cell's cell surface, in the kidney, heart tissues, arteries, and veins and, most relevant of all, on the epithelial cells (AT2)[33, 34]. Recent singh et al. studies suggest that the impact of calcium during the hyperactive stage CaSR of SARS CoV-2 will damage the cardio-renal system. CaSR inhibition can, in addition, control an increased level of intracellular calcium, oxidative stress, pro-inflammatory pathways, and cardio-renal apoptosis triggered by high levels of cytokine during infection with COVID-19, which is adversely affected[35]. In subjects who have been infected with this virus, high serum levels of proinflammatory facilitation, i.e. interleukin-12 (IL-12), IL-1β, IL-6, interferon-gamma (IFNβ), chemo-attractant protein-1 and IFN-inducible protéin, were frequently observed[35]. Moreover, in another study by singh et al., has been studied that COVID–19 activates the biochemical pathways regulated by JNK and JAK–STAT in the lung, which proliferates and transmits viral cells[36] (Figure 1).

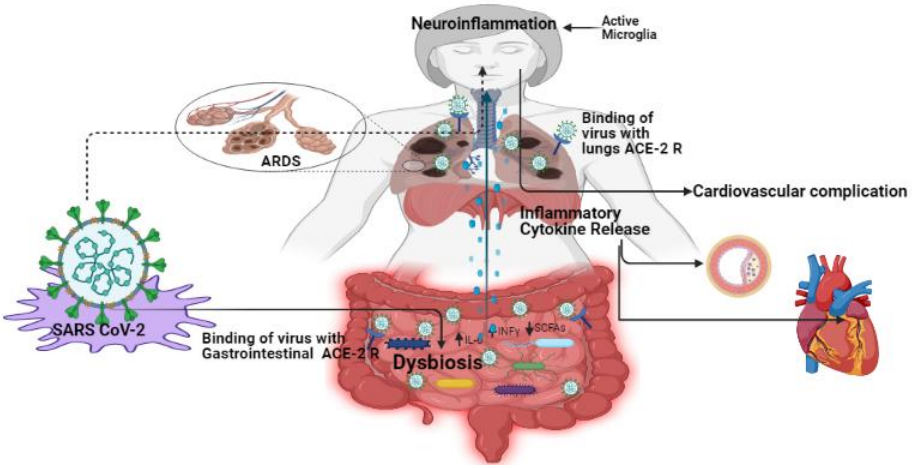

Figure 1. Pathogenesis of SARS CoV-2 attack in gestational diabetes mellitus aggravate various gut/brain and cardio-pulmonary complications

Impact of COVID-19 infection in gestational diabetes during pandemic

Diabetics are more vulnerable to infections than nondiabetics, on account of deficiencies in innate and adaptive immunity and genetic predilections[37]. Additionally, viral clearance is diminished in persons with diabetes[37]. Furthermore, an inflammatory response to viral infections is also stronger, as cytokine storms are more at risk[38]. Expression of ACE2 is enhanced by some drugs, including ACE antagonists, ARBs, ibuprofen and thiazolidinediones, for people with type 1 or type 2 diabetes[32, 39]. polymorphisms in Asian subjects of ACE2 have been associated with diabetes and hypertension, which may determinate a hereditary predisposition to serious infections[16, 40]. In addition, other comorbidities, including obesity, high blood pressure, and CVD, are often associated with diabetes. Diabetes has been linked with a greater risk of acute diseases and death in recent epidemics such as H1N1, SARS and MERS[38, 41]. The emerging COVID-19 results also accurately depict that elevated age, asthma, hypertension and CVD had a substantial rise in morbidity and deaths, and a worse overall pronouncement. In brief, it has been established that diabetes is an important risk factor for infection severity and complications, including acute lung and heart injury, hospitalization requirements, ICU enrollment and death. Comorbid diseases such as CVD, heart failure and chronic kidney disease also accompany diabetes and increase this risk more. However, it has been generally known that women with diabetes have a greater burden of concurrent comorbidities, which increase their risk, and have not yet addressed the gender disparities in people with diabetes and COVID 19[42, 43].

Nursing patient care management for gestational diabetes during SARS CoV-2 pandemic

Any patients with diabetes need to be hospitalized while they are suspected of SARS CoV-2 attack, to contact doctors or nurses. The primary healthcare

providers, in particular the nursing officers and midwives, typically serve as the first touch for pregnant females. Today, nursing officers are continuing to improve their research, specialist expertise and make self-diagnoses and care choices, with results that do not vary from those of doctors[44, 45]. In addition to managing diabetes, their broader position is increasingly recognized in many sectors including primary care, pediatrics, intensive care unit and so on [46]. Additionally, the diabetes treatment nursing officer for women with GDM are exceptionally qualified nurses with a long-term diabetes specialisation. However, as far as we know, no research tested the success of nurses or licensed clinical nurses during the SARS CoV-2 pandemic in caring for women with GDM. Patients with diabetes should be suspicious of COVID-19 infection due to fever and cough, dyspnea or lung disease, visits to a pandemic region and previous contacts with the reported COVID-19 patient. As women with diabetes are more likely to be severely infected with COVID-19, all efforts should be aimed at preventing infection. This involves regular prevention steps, including interventions with a greater impact for all patients, including more complex actions such as nutrition, health awareness, stress management and optimized cardiometabolic regulation. The handling of COVID-19 in diabetes is not distinct from the handling of diabetes-free patients. It is necessary to understand, however, that there is a greater chance of complications, and therefore a lower hospitalization threshold must be retained. A lack of glycaemic regulation has shown an increased risk for extreme disease and mortality in respiratory viral diseases; plasma glucose levels are an independent forecast for morbidity and mortality in SARS CoV-2 attack. Alveolar epithelial cells have been shown to increase their viral replication in vitro at elevated glucose concentrations. The risk of acute lung damage and hyperglycaemia impairs immune responses and organ function. That allows for an effective regulation of glycaemia in those with COVID-19 diagnosed diabetes (Figure 2).

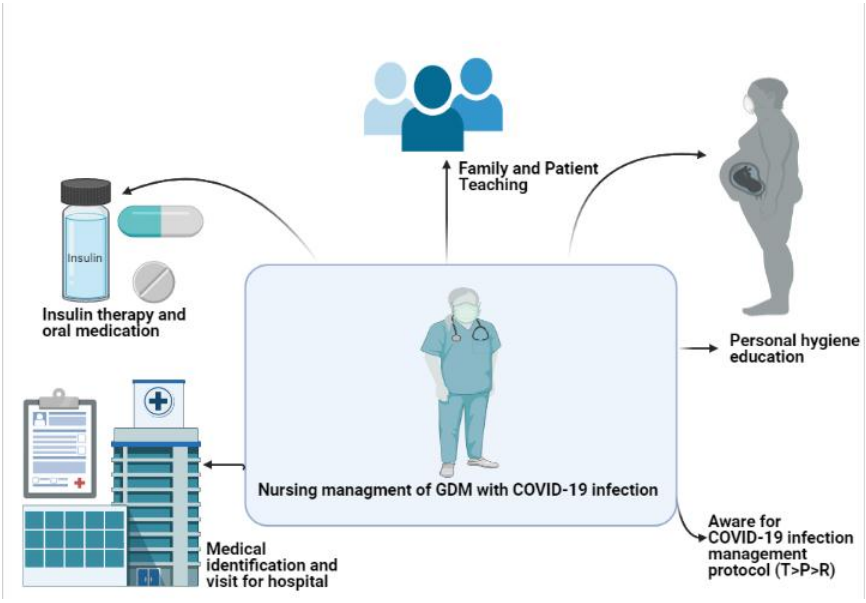

Figure 2. Exhibits the nursing patient care in gestational diabetes during SARS CoV-2 pandemic

Patients with gestational diabetes can use facemasks if patients wish to go to hospital or clinic. They will be diagnosed by the nurse by taking the nasal or throat samples[47-49]. The group of women with gestational diabetes needs careful and regular attention. In GDM patients a 2-hour oral glucose tolerance test (OGTT) is not indicated as a result of protracted waiting time in the medicine centers and insufficient facilities. Instead, screening with HbA1c and spontaneous plasma glucose analyses[50]. However, for the initiation of insulin on their first visit any patient with gestational diabetes can attend face-to-face consultations. Minor dose adjustments could be needed and to follow-up gestational diabetes[51]. Since the hormonal alterations in the cardioregulatory and immune systems present in her gestation, woman is more susceptible to viral infection. Under the guidance recently issued by the treatment of diabetes during pregnancy requires protocols and modifications to medical treatment, the care of pregnant patients is dependent on external administration of insulin [52]. Based on SARS and MERS, previous experience shows that these respiratory conditions were associated with more serious disease and an elevated risk of miscarriage, early birth, premature foal development, and maternal mortality[53].

Conclusion

COVID-19 poses major healthcare problems, in particular in persons with chronic cardio-metabolic diseases including DM. Females with diabetes are vulnerable, and sometimes, despite possessing a heavy burden of comorbidities and complications, they receive suboptimal diabetes treatment and assistance. Further the nursing staffs themselves are qualified, they will provide women with better training in the health, as has not always been the case. furthermore, the nursing staff should be provided with in-service input on how to provide the patient a more positive attitude. Overall, this review shows a good care impact on a COVID–19 woman with gestational diabetes mellitus through a robust multidisciplinary team including nursing officer. Targeted care and nursing approaches should be conducted in clinical practice depending on the current state of patients.

Conflict of interest

There is no conflict of interest, the authors declare.

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